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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,014	04/03/2001	Chun-Chi Wang	4006-118	6473

7590

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EXAMINER

FOONG, SUK SAN

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 08/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/824,014

Applicant(s)

WANG ET AL.

Examiner

Suk-San Foong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 8 and 16 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. There is no discussion in the specification as originally filed of “the oxide layer between the second silicon nitride layer and the first silicon nitride layer is also removed after the second silicon nitride layer and the first silicon nitride layer are removed.” (See 1242 OG 172)

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 6-8 and 14-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 6, 14 and 17, it is questioned what is recited through the term “clean bench”. For the purposes of the rejections below, it is seen to be any apparatus that can perform wet etching.

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6. Claim 7, 15, and 18, it is questioned what is recited through the term “thermal”. If particular temperature is intended, it must be clearly recited.
7. Claims 8 and 16, it is questioned how the oxide layer between first and second silicon nitride layers can be removed after removing the nitride layers in view of the apparent necessary removal of the oxide layer covering the first silicon nitride layer prior removing the first nitride layer.
8. Claims 8 and 16 have not been rejected over the prior art because, in light of the 35 U.S.C. 112 rejections supra, there is a great deal of confusion and uncertainty as to the proper interpretation of the limitations of the claims; hence, it would not be proper to reject the claims on the basis of prior art. As stated in *In re Steele*, 305 F.2d 859, 13 USPQ 292 (CCPA 1962), a rejection under 35 U.S.C. 103 should not be based on considerable speculation about the meaning of terms employed in a claim or assumptions that must be made as to the scope of the claims.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

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(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

10. Claims 9-12, 14, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Andrews et al. ('709).

Andrews et al. disclose a method of forming shallow trench isolation which includes providing silicon substrate 10, forming oxide layer 30 on substrate 10, subsequently forming first silicon nitride layer 40 over oxide layer 30 (Paragraph [0017]), then forming shallow trench 20 through first silicon nitride layer 40 and substrate 10 by dry etching (Fig. 1), then forming oxide layer 50 over substrate 10 and filling trench 20 by HDPCVD (Paragraph [0018]), subsequently wet etching oxide layer 50 until first silicon nitride layer 40 is exposed (Paragraph [0021], and Fig. 2), then forming and defining photoresist 60 over trench 20 (Paragraph [0022], and Fig. 3), subsequently etching a portion of oxide layer 30 by an etching process until first silicon nitride layer is exposed (Fig. 4), then removing photoresist 60 (Paragraph [0023]), then removing remaining portions of oxide layer 50 (Fig. 6), and removing first silicon nitride layer 40 through phosphoric acid wet etching (Paragraph [0023] and Fig. 6).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 1-7, 13, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrews et al. ('709) as applied to claims 9-12, 14, and 15 above, and further in view of Walsh et al. ('741) and Wolf.

Andrews et al. do not disclose forming second silicon nitride layer.

Walsh et al. teaches a method of forming shallow trench isolations which includes providing substrate 10 (Col. 2, lines 39-40), depositing first silicon nitride layer 20 (Col. 2, line 40), then etching silicon nitride layer 20 and substrate 10 to form trenches 25 (Col. 2, line 43), subsequently depositing oxide layer 40 by HDPCVD to fill trenches 25 and over substrate 10 (Col. 2, lines 46-67, Fig. 3), then etching oxide layer 40 to expose edges of first silicon nitride layer 30 (Col. 3 lines 1-4, and Fig. 4), then forming second silicon nitride layer 50 on substrate 10 covering oxide layer 40 and first silicon nitride layer 30 (Col. 3, lines 9-11, and Fig. 5), then forming and patterning photoresist 60 over second nitride layer 30 (Col. 3, lines 20-22, and Fig. 6), subsequently etching a portion of second silicon nitride layer 30 (Col. lines 11-15, and Fig. 7), then etching exposed oxide layer 40 (Col. 3, lines 23-25, and Fig. 8), and removing remaining

portions of first silicon nitride layer 30 and second silicon nitride layer 50 (Col. 3, lines 27-29, and Fig. 9).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable the formation of second silicon nitride layer in the process of Andrews et al. to be performed and obtain further advantage of producing a uniform surface across die and wafer and reducing cost of fabrication (Walsh et al., Col. 2, lines 1-7).

The combination of Andrews et al. and Walsh et al. do not disclose etching second silicon nitride layer and oxide layer by dry etching.

Wolf teaches etching of silicon dioxide and silicon nitride layers by a dry etching process (pgs. 555-556).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Wolf with combination of Andrews et al. and Walsh et al. because it would enable the step of etching a portion of oxide layer 30 and second silicon nitride layer 50 of combination of Andrews et al. and Walsh et al. to be performed.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

SF
July 29, 2002


George Fourson
Primary Examiner
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